Notes on Conditional Relationships and Interactive Terms

To go with Wright, 1976
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Relationships can be **CONDITIONAL**.

Look at the change in relationships across groups, time, geography, etc..

Regression Models:

\[
Y = \alpha_0 + \alpha_1 X + \epsilon_1
\]  \hspace{1cm} (1)

\[
Y = \beta_0 + \beta_1 X + \beta_2 G^S + \epsilon_2
\]  \hspace{1cm} (2)

\[
Y = C_0 + C_1 X^S + C_2 X^N + C_3 G^S + \epsilon_3
\]  \hspace{1cm} (3)

Where:

• \( C_0 \) = intercept for group \( N \)
• \( C_1 \) = slope of \( X \) for group \( S \)
• \( C_2 \) = slope of \( X \) for group \( N \)
• \( C_3 \) = intercept difference between \( N \) and \( S \)
• \( X^S = X \) for cases in group \( S \); else 0
• \( X^N = X \) for cases in group \( N \); else 0
Model (3) is really 2 separate regressions, though we assume they have the same variance ($\sigma^2$)

We can compare models (2) and (3) using F-tests.

We are testing the restriction:

$$C_1 = C_2$$  \hspace{1cm} (4)

So this is an F-test with 1 linear restriction.

See Wright, Table 3, page 364 for an examination of whether the relationship between income *levels* and income *inequality* is the same for the South and Non-South.